

M.Sc. (CHEMISTRY) PART-I SESSION 2023-2024

PAPER- MSCHE 104(A): MATHEMATICS FOR CHEMISTS

(For Students without Mathematics in B. Sc.)

Maximum Marks: 100

Lectures: 60

Semester Examination: 70

Internal Assessment: 30

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Time: 3hrs

Pass marks: 35%

COURSE OUTCOMES

- CO1:** To understand the basic concepts of Matrix Algebra such as Addition and multiplication.
- CO2:** To find determinants inverse, adjoint and transpose of matrices.
- CO3:** To solve Homogeneous, non-homogeneous, linear equations.
- CO4:** To find linear dependence and independence. Eigen values and Eigen vectors.
- CO5:** To be familiar with relation between degree and radian.
- CO6:** To learn Concept of periodicity of trigonometric functions, values of trigonometric functions for different angles, trigonometric functions of sum and differences of angles, additions and subtraction formulae.
- CO7:** To understand Differentiability, rules for differentiation, applications of differential calculus including maxima and minima.
- CO8:** To understand Basic rules for integration, integration by parts, partial fraction and Substitution, definite integrals.
- CO9:** To obtain an integrating factor which may reduce a given differential equation into an exact one and eventually provide its solution.
- CO10:** Identify and obtain the solution of Clairaut's equation.
- CO11:** Find the complementary function and particular integrals of linear differential equation.
- CO12:** To conceive the basic concepts of Permutations and combinations, probability, probability theorems examples from the Kinetic theory.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units: I, II, and III. Unit I will have four questions (from the respective unit of syllabus) carrying 10 marks each, Unit II will also have four questions (from the respective unit of syllabus) carrying 10 marks each. Unit III will consist of 10 short answer questions that will cover the entire syllabus and will be of 3 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions from each unit I, II and unit III is compulsory.

Note: Internal assessment will be given on the basis of mid semester tests (15), attendance (8), and assignments (7).

Ms. Namita Berry

Dr. Shalini Gupta

Prof. S.S. Dhaliwal

Dr. Sapna Sharma

Mr. Bharat Bhushan

Mr. Gajjeet Singh

Ms. Roonam Chawla

Ms. Shivdeep Kaur

Mr. Shant Bansal

Dr. Rajinder Pal

UNIT-I

Matrix Algebra: Addition and multiplication, determinants (up to 4th order) inverse, adjoint and transpose of matrices, special matrices (Symmetric, skew-symmetric, Hermitian, skew-Hermitian, unit, diagonal, unitary etc.) and their properties.

Matrix equations: Homogeneous, non-homogeneous, linear equations and conditions for the solutions, linear dependence and independence. Cayley Hamilton Theorem, Eigen values and Eigen vectors.

Trigonometry: Degree and radian measure of positive and negative angles, relation between degree and radian, Definition of trigonometric functions with the help of unit circle, Periodic functions, Concept of periodicity of trigonometric functions, values of trigonometric functions for different angles, trigonometric functions of sum and differences of angles, additions and subtraction formulae.

UNIT-II

Calculus: Differential calculus: Differentiability, rules for differentiation, applications of differential calculus including maxima and minima.


Integral Calculus: Basic rules for integration, integration by parts, partial fraction and Substitution, definite integrals.

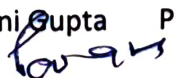
Elementary Differential Equations: Variables separable and exact, first order differential equations. Homogeneous exact and linear equations. Applications to chemical kinetics, secular equilibria, quantum chemistry etc.

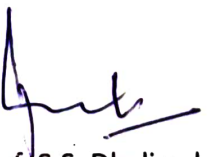
Permutation and probability: Permutations and combinations, probability, probability theorems examples from the Kinetic theory of gases.


Books Recommended:


1. *The chemistry Mathematics Book*, E. Steiner, Oxford University Press, 2nd Ed., 2008
2. *Mathematics for chemistry*, Doggett and Sucliffe, Longman, 1995
3. *Mathematical preparations for physical chemistry*, F. Daniels, McGraw Hill, 1958.

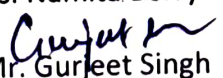

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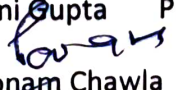

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